

# University of Saskatchewan ISF Projects

## Background

**\$1,050,977 investment (\$3,235,968 total value)**

### **1. Biofabrication Lab for Tissue Engineering Innovation**

The research will focus on tissue engineering, which means fabricating tissue and organ substitutes that can be implanted into patients to treat and repair tissue and organ injuries. Potential benefits include: treatment for heart attacks, cartilage injuries, tooth defects and bone defects.

### **2. Designing ultrasound microbubbles to image and treat inflammatory bowel disease**

Genetic and environmental factors can disrupt the gastrointestinal tract, resulting in inflammation and disease. In humans this results in inflammatory bowel disease (IBD), a life-long ailment that affects one in 150 Canadians. Potential benefits of this research include the design of new, non-invasive, imaging contrast agents for detecting inflammation in the gastrointestinal tract and for potential treatments.

### **3. Using automated molecular techniques to identify toxic chemicals and understand cannabinoid drugs**

Provides equipment to study the toxicity of environmental chemicals, such as pesticides, and search for therapeutic compounds/drugs that can enhance biological resistance towards chemicals. This includes research into the biological effects of Cannabis and development of future cannabinoid-based medicines.

### **4. Developing new therapies for HIV-1**

The research will focus on how human and HIV virus proteins interact with each other, using equipment to help design and develop new ways to treat this disease. The research is unique because this will lead to a therapeutic compound that can use the body's own defenses - a key goal in the medical field.

### **5. Improving value-added processing of carbohydrates**

Provides equipment to apply extrusion technology to existing and new raw materials in the Western Canadian agri-food industry. The research will examine the effect extrusion processing has on the quality and nutritional value of carbohydrates in new human foods, pet foods, animal feeds, and bioproducts made from these new materials. These research efforts aim to generate new value from primary agricultural commodities and support sustainable growth of Canada's agri-food sector.

## **6. Driving simulation laboratory for developing driver screening tools and rehabilitation programs**

The Driving Simulation Laboratory will be the first of its kind in Canada and one of only a handful of such facilities world-wide. The facility will be used to investigate evidence-based driving assessment protocols for high-risk drivers and look at ways to improve driving performance in both young and old drivers. The goal is to reduce the number of motor vehicle collisions and improve road safety.

## **7. Improving cryopreservation for organ and tissue transplantation**

The critical shortage of tissues and organs for human transplantation and therapeutic medicine could be solved worldwide by safely freezing biological material in liquid nitrogen (cryopreservation), currently successful at smaller scales but impossible for most tissues and all organs. To scale up the success to tissues and organs, the research will use unique cutting-edge equipment to adjust computer models of how tissue gets damaged, and rapidly improve cryopreservation methods.

## **8. Improving computer chip technology**

The research aims to improve the reliability of silicon technology such as computer microprocessors, implanted medical devices, and aerospace instruments, which frequently have errors induced by particles from space and by radioactive materials used during manufacturing. The research will use a new pulsed laser system to effectively simulate radiation from the particles by injecting faults into integrated circuits, research that will lead to cost-effective technology to protect against these errors.

## **9. Uncovering cyberattackers' identities**

Cyberattacks are on the rise, affecting every aspect of daily life. To predict and detect attacks, the research will focus on the digital identity of an "adversary" - the person or people launching the attacks. New equipment will be purchased to develop and analyze methods for monitoring adversaries and their behavior, leading to a reduction in cybercrime.

## University of Regina ISF Projects

**\$728,367 investment (\$1,953,907 total value)**

### **1. Improving cannabis-related health and safety**

The research will focus on developing a chemical fingerprinting method which will allow for the identification of illicit Cannabis products and determine their potency and harmful contaminants. The major aims of this research program include finding ways to quantify long-term health effects of cannabis use. These analytical tools will assist law enforcement, health practitioners and growers.

### **2. Cold Region Erosion and Flooding Research Laboratory**

The research will investigate the interaction between ice-affected rivers, sediment and hydraulic structures, including bridge piers and dikes, in cold regions. This project will focus on developing innovative ways to deal with ice jams, erosion and cold region structural engineering.

### **3. Infrastructure to support Canada Research Chair in chemogenomics and antimicrobial research**

The research will focus on antimicrobial resistance. Existing antibiotics fail to treat infections, and this has become an acute problem to the health of Canadians. The long-term goal is to discover antimicrobials that cripple microbes' ability to cause infection or resist antibiotics, providing new potential therapeutics for infectious disease.

### **4. Regina Cube for Multiple Particles**

The research will focus on understanding the forces that drive sudden changes with radioactive decay. An array and mechanical support structure will be built at the University of Regina. This will provide solutions to industry and academic institutions, focusing on priority areas like natural resources (mining exploration), healthcare (medical isotopes), safety and security (radiation detection and monitoring) and accelerator-driven technologies.

### **5. Infrastructure for Cardiovascular and Metabolic Health Research**

The research will investigate the acute and chronic effects of diet and exercise on cardiometabolic health and food intake regulation in individuals that are obese. The incidence of obesity is substantially increasing in Canada with Saskatchewan having the highest obesity rate per capita. The studies will investigate potential mechanisms responsible for diet and exercise-induced appetite suppression in obesity. The objective is to provide a foundation for advice on diet and exercise in preventing and managing overeating. There is no initiative of similar scope and practice in Canada. The outputs from these studies are anticipated to yield substantial health and economic benefits to Saskatchewan and Canada.